



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.                    | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/635,647                         | 08/07/2003  | Jun-hee Choi         | 030681-568          | 8798             |
| 21839                              | 7590        | 09/09/2004           | EXAMINER            |                  |
| BURNS DOANE SWECKER & MATHIS L L P |             |                      | COLON, GERMAN       |                  |
| POST OFFICE BOX 1404               |             |                      | ART UNIT            |                  |
| ALEXANDRIA, VA 22313-1404          |             |                      | PAPER NUMBER        |                  |

2879

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/635,647

Applicant(s)

CHOI ET AL.

Examiner

German Colón

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/754,275.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The Amendment, filed on June 14, 2004, has been entered and acknowledged by the Examiner.
2. Addition of claims 3-5 has been entered.

### ***Drawings***

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, “the resistor layer formed both over and beneath the cathode” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified

and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

4. The disclosure is objected to because of the following informalities:

Page 1, line 20 refers to a faceplate 9; however, it should be faceplate 8.

Appropriate correction is required.

### ***Claim Objections***

5. Claim 2 is objected to because of the following informalities:

The recitation of “a resistor layers” in claim 2, seems to be grammatically incorrect. It should be either “resistor layers” or “a resistor layer”.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choo (US 5,910,704) in view of either Nakamoto (US 6,097,138) or Blanchet-Fincher et al. (US 6,020,677).

Art Unit: 2879

Regarding claim 1, Choo discloses a field emission device comprising:

a substrate **10**;

a cathode **11** formed over the substrate;

micro-tips **15** formed on the cathode;

a gate insulating layer **13A** with wells **131A** each of which a single micro-tip is located in, the gate insulating layer formed over the substrate;

a gate electrode **14A** with gates **141A** aligned with the wells such that each of the micro-tips is exposed through a corresponding gate, the gate electrode formed on the gate insulating layer;

a focus gate insulation layer **13B** having openings each of which one or more gates correspond to, the focus gate insulation layer formed on the gate electrode; and

a focus gate electrode **14B** with focus gates aligned with the openings of the focus gate insulation layer, the focus gate electrode formed on the focus gate insulation layer. Choo is silent regarding the limitation of the micro-tips having nano-sized surface features.

However, in the same field of endeavor, Nakamoto and Blanchet-Fincher disclose field emitters comprising micro-tips having nano-sized surface features in order to provide a device with uniform field emission characteristics, capable of being driven with a low voltage, and also having a high field emission efficiency (see '138, Col. 2, lines 25-27; or '677, Col. 4, lines 12-16 and Col. 8, lines 65-67). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the emitters of Choo, with the micro-tips having nano-sized surface features, as disclosed by Nakamoto and Blanchet-Fincher, with the purpose of

Art Unit: 2879

providing a device with uniform field emission characteristics, capable of being driven with a low voltage, and also having a high field emission efficiency.

Regarding claim 2, Choo discloses a resistor layer 12 formed over the cathode.

Regarding claim 3, Choo-Nakamoto (or Choo-Blanchet-Fincher) discloses the micro-tips having nano-sized surface features comprising a plurality of nano-tips (see '138, Figs. 12 and 16; or '677, fig. 11).

8. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choo-Nakamoto (or Choo-Blanchet-Fincher) as applied to claim 1 above, and further in view of Jones et al. (US 5,663,608).

Choo-Nakamoto (or Choo-Blanchet-Fincher) discloses the claimed invention including a resistor layer formed over the cathode, but is silent regarding the limitation of "a resistor layer being formed beneath the cathode, or resistor layers being formed over and beneath the cathode".

However, it is well known in the art to provide resistor layer disclosed by Choo either over and/or beneath a cathode to control the emission current of the micro-tip, as evidenced by Jones (see at least Fig. 23). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a resistor layer beneath or over and beneath a cathode, in order to control the emission current of a micro-tip, as evidenced by Jones.

### ***Double Patenting***

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed.

Art Unit: 2879

Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 1-5 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-2 of copending Application No. 09/754,273 in view of Yamaguchi et al. (US 5,955,850) and Nakamoto (US 6,097,138) for the reasons given below.

This is a provisional obviousness-type double patenting rejection.

| Application SN<br>10/635,647 | Co-Pending Application<br>SN 09/754,273 | Reasons for rejecting under obviousness-type<br>double patenting.  |
|------------------------------|---|--|
| Claim 1                      | Claim 1 in view of<br>US '850           | <p>Co-pending application '273 claims discloses a field emission device comprising: a substrate; a cathode formed over the substrate; micro-tips having nano-sized surface features, formed on the cathode; a gate insulating layer with wells each of which a single micro-tip is located in, the gate insulating layer formed over the substrate; and a gate electrode with gates aligned with the wells such that each of the micro-tips is exposed through a corresponding gate, the gate electrode formed on the gate insulating layer. Co-pending application '273 is silent regarding the limitation of further providing a focus gate insulation layer and a focus gate electrode.</p> <p>However, in the same field of endeavor, Yamaguchi discloses an FED comprising a gate insulating layer and a gate electrode, further comprising a focus gate insulation layer and a focus gate electrode with the purpose minimizing a decrease in electron flow emitted from an emitter, thus focusing the electron flow without increasing ineffective current (see Col. 3, lines 60-64). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a gate focus electrode in order to minimize a decrease in electron flow emitted from an emitter, thus focusing the electron flow</p> |

|                |  |   |
|----------------|--|---|
|                |  | without increasing ineffective current.   |
| Claim 2        | Claim 2 in view of US '850             | Co-pending application '273 in view of US '850 claims a resistor layer being formed over or beneath the cathode, or resistor layers formed over and beneath the cathode.  |
| Claim 3        | Claim 1 in view of US '850 and US '138 | Co-pending application '273 in view of US '850 claims the claimed invention but is silent regarding the nano-sized surface features comprising a plurality of nano-tips.<br>However, US '138 discloses a micro-tip comprising nano-sized surface features including nano-tips in order to provide a device with uniform field emission characteristics, capable of being driven with a low voltage, and also having a high field emission efficiency (see '138, Col. 2, lines 25-27). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide nano-tips as the nano-sized surface features of co-pending application '273, with the purpose of providing a device with uniform field emission characteristics, capable of being driven with a low voltage, and also having a high field emission efficiency. |
| Claims 4 and 5 | Claim 2 in view of US '850             | Claims 4 and 5 are rejected over the reasons stated in the rejection of claim 2.  |

### ***Response to Arguments***

11. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to German Colón whose telephone number is 571-272-2451. The examiner can normally be reached on Monday thru Thursday, from 8:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 2879

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
gc

